REMARKS

Claims 1, 2, 4-10, 14, 15, 17, 23, 24 and 36-39 are currently pending in the application. Applicant's have added claims 25-35 and 40-42. Applicants have amended independent claims 1, 14, 23, and 36. Specifically, the element of the selective film growth method being selective to laser-absorbing polysilicon has been made express. The Examiner should note the distinction between laser-absorbing polysilicon and laser-irradiated polysilicon: laser irradiation only produces absorption if the laser has the proper wavelength. The Examiner should further note the distinction between laser-absorbing polysilicon being heated in a nitridization process and the ammonia gas atmosphere around the polysilicon being photochemically radicalized as the ammonia itself absorbs laser photons. Applicants request reconsideration of the application in light of the following remarks.

Rejections under 35 U.S.C. § 102

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). A valid reference for anticipation must contain "enabled disclosure." (See, *In re Samour*, 571 F.2d 559, 197 USPQ 1 (CCPA 1978).

Claims 1, 2, 4-7, 14, 15, 23, 24, 36, and 37

Claims 1, 2, 4-7, 14, 15, 23, 24, 36, and 37 were rejected under 35 U.S.C. § 102(e) as being anticipated by Mase, et al. (U.S. Patent No.6,200,868 B1, hereinafter "Mase").

Applicants respectfully traverse this rejection, in part because of the amendments, and request reconsideration of the claims.

Applicant's selective film growth method is selective to laser-absorbing polysilicon structures. Mase's film growth method is selective to polysilicon that has been ion-implanted with nitrogen and then annealed in an atmosphere of nitrogen in an oxygen diffusion furnace. (Mase, col 10, lines 53-66). Applicants' independent claim 1 recites selectivity to laser-absorbing polysilicon. (App. Claim 1, lines 5-6). Applicant's independent claim 14 recites selectivity to laser-absorbing polysilicon (App. Claim 14, line 7). Applicant's independent claim 23 recites selectivity to laser-absorbing polysilicon (App. Claim 23, line 6). Applicant's independent claim 36 recites selectivity to laser-absorbing polysilicon (App. Claim 36, line 8). Mase does not disclose the element of selectivity to laser-absorbing polysilicon. Consequently, Mase does not anticipate Applicants' claims 1, 14, 23, and 36.

Mase does not disclose the element (App. claim 23, line 5) of trimming an electrically significant portion of the polysilicon using a nitridization process. Mase's process, disclosed at column 10, line 35 to column 11, line 27, is to a process of forming nitride sidewalls, in which the gate electrode is "slightly smaller" (col. 11, line 4) as a side effect. Mase's intended result is to leave a silicon nitride layer beside the gate electrode (Col. 11, lines 22-23) to form a side insulation layer. (Col. 1, line 25). Mase nowhere discloses making electrically significant changes to the gate by means of selective nitridation. Consequently, Mase does not disclose every element of Applicants' claim 23. By the same reasoning, Mase does not disclose every element of claim 36. (App. Claim 36, line 6).

Mase does not disclose Applicants' claim element of compensating n-channel and p-channel devices. (App. Claim 14, lines 8-9). Device compensation comprises sizing the gates of n-channel and p-channel devices differently to achieve proper timing between p-channel and n-channel devices. (App. Page 5, lines 11-24). The citations given by the Examiner disclose that Mase's sidewalls may be formed on n-channel or p-channel devices, but Mase does not disclose using his method to differentially size and shape the gates to obtain coordinated operational speeds. Consequently, Mase does not disclose every element of Applicants' claim 14. By the same reasoning, Mase does not disclose every element of claim 36. (App. Claim 36, lines 8-9)

Mase does not disclose Applicant's claim element forming additional nitride or oxide layers on the trimming film. (App. claim 7, lines 2-3). The source electrode 16, shown on the interlayer insulation film 17 in FIG. 7, as cited by the Examiner, is neither an oxide nor a nitride, but a metal, such as aluminum. (Mase, col. 6, lines 3-4). Consequently, Mase does not disclose every element of Applicants' claim 7. By the same reasoning, Mase does not disclose every element of claim 35. (App. claim 35, lines 2-3).

Because Mase does not disclose every element of Applicants' independent claims 1, 14, 23, and 36, Applicants' independent claims are not anticipated by Mase, and so should be allowed. Because all of Applicants' independent claims are allowable, the claims depending from them should be allowed. Applicants respectfully request that the anticipation rejections of claims 1,2, 4-7, 14, 15, 23, 24, 36, and 37 be withdrawn.

Rejections under 35 U.S.C. § 103

To establish a *prima facie* case of obviousness under 35 U.S.C. § 103, three basic criteria must be met. First, there must be some suggestion or motivation, either in the

references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited prior art reference must teach or suggest all of the claim limitations. Furthermore, the suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based upon the Applicants' disclosure. A failure to meet any one of these criteria is a failure to establish a *prima facie* case of obviousness. MPEP §2143.

Claims 8-10, 17, 38 and 39

Claims 8-10, 17, 38 and 39, were rejected by the Examiner under 35 U.S.C. § 103(a) as being unpatentable over Mase, in light of Moslehi, et al. (U.S. Patent No. 4,715,937, hereinafter "Moslehi"). Applicants respectfully traverse this rejection, in part because of the amendments, and request reconsideration of the claims.

The cited prior art references do not teach or suggest all of Applicants' claim elements, as amended. Neither Mase nor Moslehi teach or suggest gate trimming selective to laser-absorbing polysilicon. Mase does not disclose any lasers. Moslehi does not disclose absorption of laser energy into polysilicon.

In the portion of Moslehi cited by the examiner in the present office action, Moslehi does not disclose how the laser is used to form a nitride. (Moslehi, column 1, lines 21-31). In the portion of Moslehi cited by the Examiner in the previous office action, the laser was not used to provide energy to be absorbed by the polysilicon. (Moslehi, column 2, lines 9-13). The laser disclosed by Moslehi was a 15 mJ/pulse cm^2, 193 nm wavelength, ArF eximer laser which did not contribute significant thermal effect to the process. (See the Exhibit to the last Office Action, dated March 11, 2002). Rather, the laser energy was absorbed by the ammonia to photochemically generate NH_2 radicals which enhanced

nitridation. Thus, the mere mention of use of a laser to form a nitride does not disclose Applicants' claim element of forming a nitride on laser-absorbing polysilicon where other methods of employing lasers for nitridation are known. No amount of optimization of Moslehi's disclosed combination would result in Applicant's laser-absorbing polysilicon because Moslehi's combination focused on coupling laser energy into the ammonia, not the polysilicon. The best one could hope for through routine optimization of Moslehi's disclosure would be to couple even more of the laser energy into the ammonia.

Claims 8-10, 17, 38 and 39 are dependent claims, and so include all of the elements of their independent claims. As amended, all of Applicants' independent claims contain the element of trimming selective to laser-absorbing polysilicon. Mase and Moslehi, alone or in combination, do not disclose this element . Because Mase and Moslehi do not disclose all elements of Applicants' claims, Applicants' claims 8-10, 17, 38 and 39 should not be held obvious by the Examiner.

Applicants respectfully disagree with the Examiner's statement that "it would have been within the scope of one of ordinary skill in the art to combine the teachings of Mase, et al., and Moslehi, et al., to enable the gate conductor trimming step to be performed and also to obtain ultra-thin, high quality insulators." Claims 8-10, 17, 38, and 39, to which the Examiner's remark is addressed, do not recite the formation of insulators and do recite gate trimming. The reference cited by the Examiner in support of the quoted remark is only pertinent to forming insulators. Thus, the Examiner has cited no reference for what might have been the pertinent portion of the remark. Neither Mase nor Moslehi teach or suggest gate conductor trimming, which may explain why the Examiner has provided no reference to same in support of the quoted remark. Because the Examiner has no evidentiary support for combining the teachings of Mase and Moslehi to teach gate trimming, the Examiner has not carried the burden of presenting a prima facie case of obviousness against claims 8-10, 17, 38 and 39.

Applicants respectfully request that the obviousness rejections of claims 8-10, 17, 38 and 39 be withdrawn.

Summary

In summary, and in view of the amendments herein, none of the references cited by the Examiner nor any other known prior art, either alone or in combination, disclose the unique combination of features disclosed in applicant's claims presently on file. For this reason, allowance of all of applicant's claims is respectfully solicited.

Regarding Doctrine of Equivalents

Applicants hereby declare that any amendments herein that are not specifically made for the purpose of patentability are made for other purposes, such as clarification, and that no such changes shall be construed as limiting the scope of the claims or the application of the Doctrine of Equivalents. Specifically, read in light of the specification, Applicants' selective film growth method in independent claims 1, 14, 23, and 36 was always selective to laser-absorbing polysilicon, and Applicant surrenders nothing by the amendments to the independent claims.

CONCLUSION

The amendments herein added 1 new independent claim and 3 new dependent claims, resulting in fees due of $134.00 to be deducted from IBM Corp. Deposit Account No. 09-0456. If any fees additional fees, including extension of time fees, are due as a result of this response, please charge IBM Corp. Deposit Account No.09-0456. This authorization is intended to act as a constructive petition for an extension of time, should an extension of time be needed as a result of this response. The examiner is invited to telephone the undersigned if this would in any way advance the prosecution of this case.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claim 1. (Amended) A method for forming a trimmed gate in a transistor comprising the steps of:

forming a polysilicon portion of a gate conductor on a substrate having a semiconductor portion; and

trimming the polysilicon portion by a [selective] film growth method selective to laser-absorbing polysilicon.

Claim 2. (Unchanged) The method of claim 1, wherein the selective film growth method comprises selective surface nitridation.

Claim 3. (Withdrawn)

Claim 4. (Unchanged) The method of claim 1, wherein the step of trimming the polysilicon portion further comprises selectively compensating n-channel and p-channel devices.

Claim 5. (Unchanged) The method of claim 1, additionally comprising the step of at least partially removing the trimming film.

Claim 6. (Unchanged) The method of claim 1, wherein the trimming film is anisotropically etched, forming gate conductor spacers.

Claim 7. (Unchanged) The method of claim 1, wherein the trimming film is silicon-rich and the method further comprises the step of forming additional nitride or oxide layers on the trimming film.

Claim 8. (Unchanged) The method of claim 2, wherein the step of trimming the gate conductor by selective surface nitridation comprises exposing structures formed on the semiconductor portion to 50-1000 expose pulses of laser irradiation with an energy fluence of 200-700 mJ/cm^2 in the presence of ammonia at a pressure of 10-1500 torr.

Claim 9. (Unchanged) The method of claim 8, wherein the step of trimming the gate conductor by selective surface nitridation comprises exposing structures formed on the semiconductor portion to about 150 expose pulses of 308 nm laser irradiation with an energy fluence of 400-500 mJ/cm^2 in the presence of ammonia at a pressure of about 300-500 torr.

Claim 10. (Unchanged) The method of claim 9, wherein ammonia is supplied at about 100 ccm/min.

Claim 11. (Withdrawn)

Claim 12. (Withdrawn)

Claim 13. (Withdrawn)

Claim 14. (Amended) A method for forming selectively compensated semiconductor devices comprising the steps of:

forming a plurality of polysilicon portions of gate conductors on a substrate having a semiconductor portion;

masking at least one polysilicon portion intended for a n-channel device;

trimming at least one unmasked polysilicon portion intended for a p-channel device by a [selective] film growth method selective to laser-absorbing polysilicon, wherein the extent of trimming is selected to accomplish device compensation of the p-channel and n-channel devices.

Claim 15. (Unchanged) The method of claim 14, wherein the selective film growth method comprises selective surface nitridation.

Claim 16. (Withdrawn)

Claim 17. (Unchanged) The method of claim 15, wherein the step of trimming the gate conductor by selective surface nitridation comprises exposing structures formed on the semiconductor portion to about 150 expose pulses of 308 nm laser irradiation with an energy fluence of 400-500 mJ/cm^2 in the presence of ammonia at a pressure of about 300-500 torr.

Claim 18. (Withdrawn)

Claim 19. (Withdrawn)

Claim 20. (Withdrawn)

Claim 21. (Withdrawn)

Claim 22. (Withdrawn)

Claim 23. (Amended) A method for forming a trimmed gate in a transistor comprising the steps of:

forming a polysilicon portion of a gate conductor on a substrate having a semiconductor portion; and

trimming at least an electrically significant portion of the polysilicon portion by a [selective] film growth method selective to laser-absorbing polysilicon.

Claim 24. (Unchanged) The method of claim 23 wherein the step of trimming the polysilicon portion comprises trimming only a portion of the polysilicon portion.

Claim 25. (New) The method of claim 23, wherein trimming at least an electrically significant portion of the polysilicon portion comprises reacting the polysilicon portion to a depth of at least ten nanometers.

Claim 26. (New) The method of claim 23, wherein trimming at least an electrically significant portion of the polysilicon portion comprises reacting the polysilicon portion to a depth within a range of 10 to 100 nanometers.

Claim 27. (New) The method of claim 23, wherein the selective film growth method comprises selective surface nitridation.

Claim 28. (New) The method of claim 27, wherein the step of trimming the gate conductor by selective surface nitridation comprises exposing structures formed on the semiconductor portion to 50-1000 expose pulses of laser irradiation with an energy fluence of 200-700 mJ/cm^2 in the presence of ammonia at a pressure of 10-1500 torr.

Claim 29. (New) The method of claim 28, wherein the laser irradiation is of a wavelength absorbed by the gate material selective to surrounding materials.

Claim 30. (New) The method of claim 28, wherein the step of trimming the gate conductor by selective surface nitridation comprises exposing structures formed on the semiconductor portion to about 150 expose pulses of 308 nm laser irradiation with an energy fluence of 400-500 mJ/cm^2 in the presence of ammonia at a pressure of about 300-500 torr.

Claim 31. (New) The method of claim 30, wherein ammonia is supplied at about 100 ccm/min.

Claim 32. (New) The method of claim 23, wherein the step of trimming at least an electrically significant portion of the polysilicon portion further comprises selectively compensating n-channel and p-channel devices.

Claim 33. (New) The method of claim 23, additionally comprising the step of at least partially removing the trimming film.

Claim 34. (New) The method of claim 23, wherein the trimming film is anisotropically etched, forming gate conductor spacers.

Claim 35. (New) The method of claim 23, wherein the trimming film is silicon-rich and the method further comprises the step of forming additional nitride or oxide layers on the trimming film.

Claim 36. (Amended) A method for forming selectively compensated semiconductor devices comprising the steps of:

forming a plurality of polysilicon portions of gate conductors on a substrate having a semiconductor portion;

masking at least one polysilicon portion intended for a n-channel device;

trimming at least an electrically significant portion of one unmasked polysilicon portion intended for a p-channel device by a [selective] film growth method selective to laser-absorbing [irradiated semiconductor material] polysilicon, wherein the extent of trimming is selected to accomplish device compensation of the p-channel and n-channel devices.

Claim 37. (Unchanged) The method of claim 36, wherein the selective film growth method comprises selective surface nitridation.

Claim 38. (Unchanged) The method of claim 37, wherein trimming comprises reacting the polysilicon portion to a depth of at least ten nanometers.

Claim 39. (Unchanged) The method of claim 37, wherein the step of trimming the gate conductor by selective surface nitridation comprises exposing structures formed on the semiconductor portion to about 150 expose pulses of 308 nm laser irradiation with an energy fluence of 400-500 mJ/cm^2 in the presence of ammonia at a pressure of about 300-500 torr.

Claim 40. (New) The method of claim 36, wherein the step of trimming the gate conductor comprises exposing polysilicon to laser irradiation of 308 nanometer wavelength.

Claim 41. (New) A method for trimming at least a portion of at least one structure on a semiconductor substrate, the structure comprising a material, the method comprising the steps of:

opening a mask to expose the at least a portion of the at least one structure;

abutting the surface of the at least a portion of the at least one structure with a pressurized nitrogen compound atmosphere; and

irradiating the at least a portion of the at least one structure through the open mask with a laser, the laser having a wavelength adapted to be absorbed by the material of the structure, wherein a power and pulse repetition of the laser and the pressure and a flow rate of the nitrogen compound are controlled to produce a nitride film on the at least a portion of the at least one structure.

Claim 42. (New) The method of claim 41, further comprising the step of etching at least a portion of the nitride film selective to the material of the at least one structure.